WHAT IS CLAIMED IS:

1. A method for monitoring performance of an optical network, comprising the steps of:

marking an optical signal, traveling through a section of fiber, with a fiber identification (FID) tag which is unique to the fiber section; and

detecting the fiber identification tag at various locations in the network.

2. A method as described in claim 1, wherein the step of marking comprises modulating the optical signal so that the fiber identification tag is encoded onto the optical signal.

3. A method as described in claim 2, wherein the step of modulating comprises modulating the optical signal with the fiber identification tag, which is a low frequency dither signal.

4. A method as described in claim 2, wherein the step of modulating the optical signal with the low frequency dither signal is performed by an amplitude modulation.

5. A method as described in claim 2, wherein the step of modulating comprises one of the following types of modulation: frequency modulation, phase modulation and polarization modulation.

6. A method as described in claim 4, wherein the step of modulating the optical signal with the low frequency dither signal comprises modulating with the low frequency dither tone whose frequency is unique to the fiber section.

7. A method as described in claim 1, wherein the step of detecting the fiber identification tag comprises detecting the tag at a network node.

8. A method as described in claim 4, wherein the step of detecting comprises:

tapping a portion of the optical signal; and

determining one or more of the following parameters from the tapped portion of the optical signal:

(a) frequency of the FID signal;

(b) depth of modulation of the optical signal introduced by the FID signal; and

(c) combined power of FID signals at the FID frequency.

9. A method as described in claim 1, wherein the step of marking the optical signal is performed so that selected FID tags are accumulated in the optical signal as the signal travels in the network.

10. A method as described in claim 1, wherein the step of marking the optical signal is performed so that one of the some and all of the previously introduced FID tags are removed from the optical signal.

11. A method of detecting a fiber failure in an optical network, comprising the steps of:

monitoring performance of an optical network as described in claim 1; and

indicating the possibility of fiber failure for the fiber section whose fiber identification tag is not present.

12. A method as described in claim 6, further comprising the steps of:

measuring power levels of FID tones at FID frequencies; and

indicating the possibility of one or more of the following:

a fiber section failure if the FID tone for the fiber section is not present;

an amplifier failure if power levels of combined FID tones at different frequencies decrease substantially uniformly;

a transponder failure if the power level of the corresponding FID tone decreases provided that no channels are being dropped from the respective network node; and

adding or dropping wavelength channels to fiber sections if power levels of the corresponding FID tones change.

13. A system for monitoring performance of an optical network, comprising:

means for marking an optical signal, traveling through a section of fiber, with a fiber identification tag which is unique to the fiber section; and

means for detecting the fiber identification tag at various locations in the network.

14. A system as described in claim 13, wherein the means for marking comprises an encoder for encoding a low frequency

dither signal onto the optical signal, and the means for detecting comprises a decoder for decoding said low frequency dither signal.

15. A system as described in claim 14, wherein the encoder comprises one of the following: high-speed e-VOA (variable optical attenuator), Mach-Zehnder modulator and electro-absorption modulator.

16. A method for monitoring performance of an optical network, comprising the steps of:

marking an optical signal, traveling through a section of fiber in a bundle of fibers, with a bundle identification (BID) tag which is unique to the bundle section; and

detecting the bundle identification tag at various locations in the network.

17. A method as described in claim 16, wherein the step of marking comprises modulating the optical signal with a low frequency dither signal, whose frequency is unique to the bundle section.

18. A system for monitoring performance of an optical network, comprising:

means for marking an optical signal, traveling through a section of fiber in a bundle of fibers, with a bundle identification (BID) tag which is unique to the bundle section; and

means for detecting the bundle identification tag at various locations in the network.

19. A system as described in claim 18, wherein the means for marking comprises an encoder for encoding a low frequency dither signal onto the optical signal, and the means for detecting comprises a decoder for decoding said low frequency dither signal.

20. A method for determining a topology of an optical network, comprising the steps of:

marking an optical signal with a channel identification (CID) tag which is unique to the optical signal;

marking said optical signal, traveling through a fiber section, with a fiber identification (FID) tag which is unique to the fiber section; and

detecting the tags at various locations in the network, thereby determining a path of said optical signal in the network.

21. A method as described in claim 20, further comprising the step of marking said optical signal, traveling through a fiber section in a bundle section, with a bundle identification (BID) tag which is unique to the bundle section, the step of marking with the BID tag being performed before the step of detecting.